WHAT IS CLAIMED IS:

1. An exhaust purification apparatus for an internal combustion engine, comprising:

an exhaust gas purification catalyst disposed in an exhaust passage of the engine; and

a controller that executes a poisoning release control of the exhaust gas purification catalyst when a predetermined condition is established, the poisoning release control including a normal mode and an exhaust gas composition mode before the normal mode, a manipulation parameter of the engine related to an exhaust gas composition being manipulated in such a manner that a hydrogen concentration in the exhaust gas in the exhaust gas composition mode is higher than that in the normal mode.

2. An exhaust purification apparatus for an internal combustion engine as claimed in claim 1, wherein the mode of the poisoning release control is switched from the exhaust gas composition mode to the normal mode when a temperature of the exhaust purification catalyst becomes high and is in excess of a first predetermined value.

3. An exhaust purification apparatus for an internal combustion engine as claimed in claim 2, wherein the first predetermined value is set to a temperature at which a poisoning release performance becomes stable.

4. An exhaust purification apparatus for an internal combustion engine as claimed in claim 1,

wherein, in the exhaust composition mode, an ignition timing is set toward an advance angle direction more than that in the normal mode.

5. An exhaust purification apparatus for an internal combustion engine as claimed in claim 1, wherein, during the poisoning release control, a fuel injection through a fuel injection valve used in a direct fuel injection is split into the injection under a suction stroke and that under a compression stroke.

6. An exhaust purification apparatus for an internal combustion engine as claimed in claim 5, wherein the poisoning release control further includes an exhaust gas temperature rise mode before the exhaust gas composition mode and, in the exhaust gas temperature rise mode, a rate of a fuel injection quantity under the compression stroke to a total fuel injection quantity for four strokes of the engine per cylinder is larger than the same in the normal mode.

7. An exhaust purification apparatus for an internal combustion engine as claimed in claim 5, wherein the poisoning release control further includes an exhaust gas temperature rise mode before the exhaust gas composition mode and, in the exhaust gas temperature rise mode, a rate of fuel injection quantity under the compression stroke to a total fuel injection quantity for four strokes of the engine is larger than the same in the exhaust gas composition mode.

8. An exhaust purification apparatus for an internal combustion engine as claimed in claim 5, wherein the poisoning release control further includes an exhaust gas temperature rise mode before the exhaust gas composition mode and, in the exhaust gas temperature rise mode, a rate of a fuel injection quantity under the compression stroke to a total fuel injection quantity for four strokes of the engine per cylinder is larger than the same in the exhaust gas composition mode and the same in the normal mode.

9. An exhaust purification apparatus for an internal combustion engine as claimed in claim 5, wherein the poisoning release control further includes an exhaust gas temperature rise mode before the exhaust gas composition mode and, in the exhaust gas temperature rise mode, an ignition timing is set toward a more retardation angle direction than that in the exhaust gas composition mode.

10. An exhaust purification apparatus for an internal combustion engine as claimed in claim 6, wherein, when the temperature of the catalyst becomes high and is in excess of a second predetermined value, the mode is switched from the exhaust gas temperature rise mode to the exhaust gas composition mode.

11. An exhaust purification apparatus for an internal combustion engine as claimed in claim 10, wherein the second predetermined value is a temperature at which the poisoning release control is started.

12. An exhaust purification apparatus for an internal combustion engine as claimed in claim 6, wherein the fuel injection quantity is split into the fuel injection quantity under the compression stroke and that under the suction stroke and the fuel injection quantity under the compression stroke is larger than that under the suction stroke in the exhaust gas temperature rise mode.

13. An exhaust purification apparatus for an internal combustion engine as claimed in claim 6, wherein, in the fuel injection quantity is split into the fuel injection quantity under the compression stroke and that under the suction stroke and, in the exhaust gas composition mode, the fuel injection quantity under the compression stroke is substantially equal to that under the suction stroke.

14. An exhaust purification apparatus for an internal combustion engine as claimed in claim 6, wherein, in the fuel injection quantity is split into the fuel injection quantity under the compression stroke and that under the suction stroke and, in the normal mode, the fuel injection quantity under the compression stroke is substantially equal to that under the suction stroke.

15. An exhaust purification apparatus for an internal combustion engine as claimed in claim 6, wherein a rate of a fuel injection quantity under the compression stroke to a total fuel injection quantity for four strokes of the engine per cylinder in the exhaust gas composition mode is smaller than that in

the exhaust temperature rise mode and an ignition timing in the exhaust gas composition mode is more advanced toward an advance angle direction than that in the exhaust temperature rise mode.

16. An exhaust purification apparatus for an internal combustion engine as claimed in claim 6, wherein a rate of a fuel injection quantity during the compression stroke to a total fuel injection quantity for the four strokes of the engine per cylinder in the exhaust gas composition mode is substantially equal to that in the normal mode and an ignition timing in the exhaust gas composition mode is more advanced toward the advance angle side than that in the normal mode.

17. An exhaust purification apparatus for an internal combustion engine, comprising:

an exhaust gas purification catalyst disposed in an exhaust passage of the engine; and

a controller that executes a poisoning release control of the exhaust gas purification catalyst when a predetermined condition is established, the poisoning release control including a normal mode and an exhaust gas composition mode before the normal mode, an ignition timing in the exhaust gas composition mode being set toward a more advance angle direction than that in the normal mode.

18. An exhaust purification apparatus for an internal combustion engine as claimed in claim 17, wherein the mode is switched from the exhaust gas composition mode to the normal mode, when a

temperature of the catalyst becomes high and is in excess of a first predetermined value.

19. An exhaust purification apparatus for an internal combustion engine as claimed in claim 17, wherein the poisoning release control further includes an exhaust gas temperature rise mode before the exhaust gas composition mode and, in the exhaust temperature rise mode, the ignition timing is set toward a more retardation angle direction than that in the exhaust gas composition mode.

20. An exhaust purification apparatus for an internal combustion engine as claimed in claim 19, wherein, during the poisoning release control mode, a fuel injection through a fuel injection valve used in a direct fuel injection is split into a fuel injection under a compression stroke and that under a suction stroke and a rate of a fuel injection quantity under the compression stroke to a total fuel injection quantity for four strokes of the engine per cylinder in the exhaust gas temperature rise mode is larger than that in the exhaust gas composition mode.

21. An exhaust purification apparatus for an internal combustion engine as claimed in claim 19, wherein, during the poisoning release control, a fuel injection through a fuel injection valve used in a direct fuel injection is split into a fuel injection under a compression stroke and that under a suction stroke and a rate of a fuel injection quantity under the compression stroke to a total fuel injection quantity for four strokes of the engine per cylinder

in the exhaust gas temperature rise mode is larger than that in the normal mode.

22. An exhaust purification apparatus for an internal combustion engine as claimed in claim 19, wherein, during the poisoning release control, a fuel injection through a fuel injection valve used in a direct fuel injection is split into a fuel injection under a compression stroke and that under a suction stroke and a rate of a fuel injection quantity under the compression stroke for four strokes of the engine per cylinder in the exhaust gas temperature rise mode is larger than that in the exhaust gas composition mode and that in the normal mode.

23. An exhaust purification apparatus for an internal combustion engine as claimed in claim 19, wherein the mode is switched from the exhaust gas temperature rise mode to the exhaust gas composition mode when a temperature of the catalyst becomes high and is in excess of a second predetermined value.

24. An exhaust purification apparatus for an internal combustion engine as claimed in claim 19, wherein the ignition timing in the exhaust gas temperature rise mode is set toward a more retardation angle direction than that during a normal homogeneous combustion.

25. An exhaust purification apparatus for an internal combustion engine as claimed in claim 19, wherein the ignition timing in the exhaust gas composition mode is set toward a more retardation

angle direction than that during a normal homogeneous combustion.

26. An exhaust purification apparatus for an internal combustion engine as claimed in claim 19, wherein the ignition timing in the normal mode is set toward a more retardation angle direction than that during a normal homogeneous combustion.

27. An exhaust purification apparatus for an internal combustion engine as claimed in claim 1, wherein a whole air-fuel ratio during the poisoning release control is approximately a stoichiometric air-fuel ratio.

28. An exhaust purification apparatus for an internal combustion engine as claimed in claim 5, wherein the rate of the fuel injection quantity under the compression stroke in the exhaust gas composition mode is larger than that in the normal mode.

29. An exhaust purification apparatus for an internal combustion engine as claimed in claim 6, wherein each rate of the fuel injection quantity under the compression stroke in the exhaust gas temperature rise mode and in the exhaust gas composition mode is larger than that in the normal mode.

30. An exhaust purification apparatus for an internal combustion engine as claimed in claim 1, wherein a whole air-fuel ratio in the exhaust gas

composition mode is richer than that in the normal mode.

31. An exhaust purification apparatus for an internal combustion engine as claimed in claim 6, wherein a whole air-fuel ratio in the exhaust gas composition mode is richer than that in the exhaust gas temperature rise mode.

32. An exhaust purification apparatus for an internal combustion engine as claimed in claim 1, wherein a fuel injection timing of a fuel injection under a compression stroke in the exhaust gas composition mode is set toward a more advance angle direction than that in the normal mode.

33. An exhaust purification apparatus for an internal combustion engine as claimed in claim 6, wherein a fuel injection timing of a fuel injection under a compression stroke in the exhaust gas composition mode is set toward a more advance angle direction than that in the exhaust gas temperature rise mode.

34. An exhaust purification method for an internal combustion engine, the internal combustion engine comprising:

an exhaust gas purification catalyst disposed in an exhaust passage of the engine, and the exhaust purification method comprising:

executing a poisoning release control of the exhaust gas purification catalyst when a predetermined condition is established,

the poisoning release control including a normal mode and an exhaust gas composition mode before the normal mode; and

manipulating a manipulation parameter of the engine related to an exhaust gas composition in such a manner that a hydrogen concentration in the exhaust gas in the exhaust gas composition mode is higher than that in the normal mode.

35. An exhaust purification method for an internal combustion engine, the internal combustion engine comprising: an exhaust gas purification catalyst disposed in an exhaust passage of the engine; and the exhaust purification method comprising:

executing a poisoning release control of the exhaust gas purification catalyst when a predetermined condition is established, the poisoning release control including a normal mode and an exhaust gas composition mode before the normal mode; and setting an ignition timing in the exhaust gas composition mode toward a more advance angle direction than that in the normal mode.